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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/825,826 | 04/16/2004 | Wei Liu | 8346/ETCH/CONE | 9438 |

7590 09/06/2006

Patent Counsel
Applied Materials, Inc.
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EXAMINER

PHAM, THANHHA S

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2813

DATE MAILED: 09/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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| | | | |
|------------------------------|-------------------------------|----------------------------|--|
| Office Action Summary | Application No. 10/825,826 | Applicant(s) LIU ET AL. | |
| | Examiner Thanhha Pham | Art Unit 2813 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27-63 is/are allowed.
- 6) ☒ Claim(s) 1,2,9,11-17,23 and 24 is/are rejected.
- 7) ☒ Claim(s) 3-6,8,10,18-22,25 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Oath/Declaration

1. Oath/Declaration filed on 04/16/2004 has been considered.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction is required to support original claimed limitations of "a distance between the first and second apertures is about 110 nm" in claims 7-8 and 55.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.**

► With respect to claim 9, the specification (page 7, fig 2d) while enabling for the width of elongated **structure** of about 60 nm is not enabled for use to support limitation “a first elongated **aperture** having a width of about 60 nm”.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 11 and 27-63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

► With respect to claim 11, it is not clear that “the step of etching” refers to which step of etching in claim 1 – step of laterally etching OR step of etching the layer.

► With respect to claim 27,

line 6, term “from” should be changed to “on” to clarify scope of claim

line 12, it is not clear where “a second hard mask layer” is deposited on.

line 13, it is not clear where “a second cap layer” is deposited on.

line 14, it is not clear where “a second patterned mask” is formed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-2, 12 and 23-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al. [US 6,989,333].

► With respect to claim 1, Watanabe et al (fig. 1, cols. 2-5) discloses a method of fabricating quantum features from a layer (102) of material, comprising:

forming a first hard mask (1041) having at least one elongated structure on the layer (102);

laterally etching at least one elongated structure of the first hard mask prior to etching the layer (102) (fig. 1d);

etching the layer (102) through the first hard mask to form an elongated layer feature (110); and

removing the first hard mask (1042).

► With respect to claim 2, Watanabe et al (col. 2, lines 60-63) discloses that the layer (102) contains at least one material selected from materials identified in the III-V periodic groups.

► With respect to claim 12, Watanabe et al (col. 2, lines 60-63) discloses that the layer contains at least one material selected from InP, Si--Ge and Si.

► With respect to claim 23, Watanabe et al (fig. 1e) discloses that the elongated features (110) are formed in a predefined location.

► With respect to claim 24, Watanabe et al (fig. 1e) discloses that the elongated features (110) are formed in a predefined pattern.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 7, 9, 11, 13-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. [US 6,989,333] in view of Cappuzzo et al [US 6,366,730].

► With respect to claims 7, 9 and 11, the claimed range parameters of distance between the first elongated aperture and at least a second elongated aperture structure, width of a first elongated structure and ratio of etchant are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in In re Aller 105 USPQ233, 255 (CCPA 1955)., the selection of reaction parameters such as temperature and concentration would have been obvious.

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may be impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are

termed "critical ranges and the applicant has the burden of proving such criticality... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

- With respect to claims 13-14 and 18-19, Watanabe et al substantially discloses all the limitations as claimed above except depositing a cladding material on the elongated feature to form an optical device.

However, Cappuzzo et al discloses depositing a cladding material (38, SiO₂) on the elongated feature (35) to form an optical device (see fig. 7, col. 3, lines 20-25). Therefore, at the time of invention, it would have been obvious to those skilled in the art to deposit the cladding material (SiO₂) on the elongated feature as taught by Cappuzzo et al into the process of Watanabe et al in order to protect the optical device.

- With respect to claims 15-17 and 20-22, the limitation "laser, optical modulator and optical detector" simply specifies an intended use or field of use and is not given patentable weight. It is noted that, the intended use in this device claim does not result in a structure difference between the claim invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior structure is

capable of performing the intended use, then it meets the claim. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Allowable Subject Matter

7. Claims 27-63 are allowed.
8. Claims 3-6, 8, 10, 18-22, 25 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed 6/21/2006 have been fully considered but they are not persuasive.

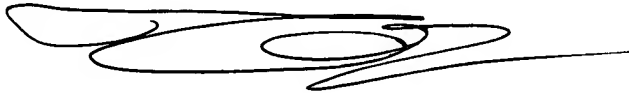
Contradict to Applicant's argument on pages 12-13, the lithography process of Wanatabe et al discloses a first hard mask since a first hard mask is just a name of a mask used for defining patterns for etching the layer in the process of Wanatabe et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

Thanhha Pham